Series III. Whispered letters.

Observer.	No. of Experiments.	Per cent. of correct guesses.
Str.	600	31
S.	400	19
M.	100	12
H.	400	16
L.	250	10
W.	200	39
Bo.	100	13
E.	106	16
Si.	200	24
P.	200	23

From these tables it appears that only one observer, B. in Series II, ever fell below 10 per cent. of correct guesses, the proportion required by mere chance, and that in this case the number of experiments was so small that the law of probability would hardly apply. In Series I, some of the observers, for instance E.,Bo.,H., and Si.,obtained so high a percentage of right guesses as to suggest that they must have been almost able to read the letters, although they declared in good faith that they could not. The possibility of reading in the ordinary sense was much less in the second series, yet two of the observers, E. and W., guessed right in more than half of the cases. In Series III,where the letters were whispered, since every case in which the observer heard the slightest sound of the whisper was ruled out, the conditions should have made ordinary perception impossible. It is noteworthy that although no observer fell below 10 per cent. of right guesses in this series, L., M., and Bo. had but little above that amount. Yet Str. and W., with 31 and 39 per cent. respectively, show that their guessing must have been somehow influenced quite decidedly in the right direction, and the others also give evidence of such influence, though in a less marked degree.

Our results, then, confirm, on the whole, those of Sidis and show that with certain observers at least judgments may be influenced in the direction of correctness when the observer is unconscious that any such influence is present. Whether this effect is due to a secondary self with superior senses, as Sidis believes, or to a physiological result of the stimulus, too slight to affect consciousness on its own account, as it were, is a question to which our experiments can furnish no answer.

VIII. A Study of Errors in the Perception of Movement on the Skin

By Ruth Hoag, Julia A. Lindemann, and M. F. Washburn

The object of this study was to test the generally accepted statement that movement and rest can be correctly discriminated when the direction of the movement is not accurately perceived, a fact which Külpe explains by the law that "general or abstract names are more easily reproduced than concrete." Movements of very slight extent on the part of a tactual stimulus were employed. The observers sat with the left arm extended on a table, and with their eyes closed. An ink-dot was made on the volar side of the wrist, about 5 cm. above the hand. Four other dots were placed at distances of one mm. from the first, one each in the central, peripheral, radial, and ulnar direc-

tions. The rubber point of an ordinary æsthesiometer was placed upon the skin at the centre dot, and either moved in one of the four directions to another dot, or held upon the centre dot for a period as nearly as possible equal to that occupied in a movement, that is, about one second. The observer judged whether the point had remained at rest, or had moved, and the direction of its motion if it was thought to have moved.

Twelve observers, all women, served in the experiments, and 7,100 experiments, in all, were made, no fewer than 500 on any one observer. It seemed at the conclusion of the study that the distribution of the errors made in so large a number of experiments was not without interest. A table showing it is therefore presented.

Actual Movement of Stimulus	Judgments					Total Errors
	Central	Peripheral	Ulnar	Radial	Rest	
Central	1094	45	58	106	117	326
Peripheral	51	1050	80	83	156	370
Ulnar	123	90	1020	43	144	400
Radial	119	84	15	1083	119	337
Rest	63	52	54	46	1205	215
Total Errors	356	271	207	278	536	

The results that appear from this table may be summarized as follows:

1. A resting stimulus is judged correctly as resting oftener than any direction of movement is correctly perceived.

2. On the other hand, when a moving stimulus is incorrectly perceived, it is more likely to be judged as at rest than as moving in a direction other than its real direction.

3. Next to a resting stimulus, the order of accuracy in the perception of the stimuli is: central, radial, peripheral, ulnar. But the superiority of the central direction is crossed by result 4 in the same way that result 1 is by result 2.

4. When the direction of a moving stimulus is incorrectly perceived, it is more likely to be called 'central' than any other direction. This is in entire accord with the results of Hall and Donaldson, who say, "We are more likely when in doubt to judge motion on the surface of the limbs to be up rather than down the axis."[1] They suggest that this is due to the fact that movements up the skin would ordinarily be produced only by some living thing, while movements downward would be common experiences through gravitation.

The possibility then suggests itself that instead of rest's being better perceived than the direction of motion, and movement in the central direction better than movement in any other direction, there may be simply a general tendency, when in doubt, to say 'Resting' or 'Moving centrally.' This would account alike for the facts that there were more correct judgments under these two heads than under the others, and that more wrongly perceived stimuli were assigned to these two classes.

Examination of the individual records of the different observers throws some light upon this point. The following facts appear from such an examination:

(*a*) Only six of the twelve observers judged the resting stimulus best of all.

(*b*) Of these, five were more apt to call a misjudged stimulus 'resting' than anything else. Two other observers showed the same tendency.

[1] *Mind*, O. S., X, 559.

(*c*) Five observers only judged the central direction either best of all or next best after the resting stimulus.

(*d*) In four out of these five cases, the number of wrong judgments that involved calling the direction of movement 'central' was either greatest of all, or second only to the number where the stimulus was called 'at rest.'

It looks, then, as if there were a tendency on the part of some of our subjects to make the judgments 'resting' or 'centrally moved' when uncertain, which may account for the apparent superiority of judgments under these two categories.

IX. A Suggestion towards a Study of the Perception of Sound Movement

By Joyce Hicks and M. F. Washburn

The method used in the experiments to be described was as follows. The observer sat with eyes closed. The experimenter stood either behind her, to her right, to her left, or in front of her, and held a König tuning fork, mounted on its sounding box, at a distance of about 50 dm. from the observer's head and on a level with her ears. Chalk marks were made on the floor 30 dm. to the right and left of the point directly over which the fork was held. The fork used was a C^3 of 1,024 vibrations. The fork was struck with a felt hammer by E and moved 30 dm. to the right, left, up, or down. The extent of the movement to the right or left was guided by the marks on the floor; the movements up or down had to have their extent governed merely by E's attempt to make it as nearly as possible equal to that of the others. The duration of the movements was governed by a rhythmic count 'one-two' mentally made by E. An equal number of experiments was made where the movement was in each of the four directions, and also when the fork was held perfectly still and allowed to sound the same length of time as that occupied by a movement. The same number of experiments, in the four directions and with the fork at rest, was made at four different positions, in front of the observer, to her right, to her left, and behind her. Seven persons served as observers, and 164 experiments were made in each of the four positions, making 656 in all.

Tables showing the results are subjoined.

Position: Front

Direction of Movement	Judgment				
	Up	Down	Right	Left	Rest
Up	39	27	30	31	37
Down	44	23	33	24	38
Right	25	9	101	13	16
Left	36	23	10	79	16
Rest	29	19	22	5	89

Total correct judgments in this position: 331.

Position: Back

Up	89	30	14	4	27
Down	27	65	22	15	34
Right	21	8	115	8	12
Left	23	11	5	96	18
Rest	28	19	5	10	102

Total correct judgments in this position: 467.